

MEMORANDUM

Date: November 27, 2017

From: Wilmington Environmental Restoration Committee (WERC)

To: Jim DiLorenzo/EPA, Garry Waldeck/DEP

Re: WERC Comments on:
Focused Remedial Investigation Report DAPL OU3
Olin Chemical Superfund Site - Wilmington, MA

WERC has completed a review of the Focused Remedial Investigations Report DAPL OU3 dated October 5, 2017. Like many previous documents for the site, numerous statements are made in the memorandum that are not supported by data or any technical analysis. WERC comments focus on the larger issues for the site. It should not be construed that WERC agrees with statements in the document if not commented on.

Comments

1. Overall.
 - a. The DAPL has also migrated into and through the bedrock fractures. The report title implies that it will address all OU3 DAPL, but it does not address “DAPL” in bedrock fractures. Again, the title should be revised and be clear it is not addressing all OU3 “DAPL”.
 - b. There is a large inconsistency in this report. Much of the report (Sections 1-5) focus on the “DAPL” without any significant characterization or even mention of NDMA. Yet in Section 6.0 only NDMA is used to determine the human health risk for the DAPL. More extensive presentation and discussion of the NDMA data needs to be added to Sections 1-5.
2. Page 1-8 DAPL: Several comments on the “DAPL” equation/definition. The equations should be updated to determine if it is still accurate for defining DAPL. The base equation/definition is as follows:

The definition of DAPL is based on having a specific gravity greater than 1.025 which can be estimated by an empirical relationship of its primary constituents, and by threshold concentrations as follows:

- Ammonia concentration greater than 1,250 milligrams per liter (mg/L);
- Chloride concentration greater than 2,800 mg/L;
- Magnesium concentration greater than 270 mg/L;
- Sodium concentration greater than 1,700 mg/L;
- Sulfate concentration greater than 16,000 mg/L; and
- Specific conductance greater than 20,600 micro-ohms per centimeter ($\mu\text{mhos/cm}$).

The equation for Specific Gravity (SG) is:

$$SG = 2.6 \times 10^{-7} \times SO_4^{2-} + 1.3 \times 10^{-6} \times Na^+ + 3.7 \times 10^{-6} \times Cl^- + 7.4 \times 10^{-7} \times NH_3 + 1.01$$

Comments:

a. This analysis was completed in 1999 by Geomega. It should be updated using the data collected since then too see if the analysis is still a reasonable predictor. For example, Olin uses Specific Conductance greater than 20,600 umhos/cm to determine the top of the DAPL. Is this still true?

b. The equation indicates that the Specific Gravity would increase with an increase in ammonia, however ammonia has a density less than 1, and an increase in ammonia will decrease, not increase SG.

c. The equation should be updated to include NDMA, the main constituent of concern for the site.

d. Though not noted, WERC suspects SG of 1.025 was selected to define the DAPL, because marine water has a SG of 1.025 also. Clearly a different SG could have been selected, such as 1.1 and a thicker "DAPL" would be defined.

e. A better definition/equation of "DAPL" would include pH. pH controls the "plugging" by precipitates of the soil and is key parameter for pumping the DAPL.

f. Vertical profiles of each parameter in the "DAPL" should be provided. Profiles would include where available, bedrock, "DAPL", Diffuse Layer" and remainder of the groundwater.

3. Page 1-9 Diffuse Layer. *This diffusion results in the presence of a "Diffuse Layer" which is a three to five foot thick layer of groundwater that overlies the DAPL, and is defined by specific conductance between 20,600 and 3,000 umhos/cm.*

Comments:

a. Olin should provide support why 3,000 umhos/cm was selected as the top of the "Diffuse Layer". Is it arbitrary? Or did it define a concentration in another parameter, SG, SC or other? Vertical profiles of the parameters are needed as noted in comment #1.

b. Diffusion of NDMA and ammonia, highly mobile parameters, has occurred well beyond 3-5 feet defined by the "diffuse Layer". Olin should clarify that the Diffuse Layer is limited to selected parameters and doesn't include NDMA and ammonia.

4. Page 1-9 Diffuse Layer. *The majority of existing dissolved phase contaminants in groundwater resulted from convective mixing during initial migration of the DAPL while the facility was being operated. The flux through the diffuse layer is likely small in comparison to those initial releases from convective mixing. Please support statement.*

This statement appears not to be true, NDMA and ammonia have diffused and will continue to diffuse long distances.

5. Page 2-12 DAPL Removal Pilot Test. *The DAPL extraction well or wells should therefore be placed at or along the low point in the DAPL pool. Closely spaced wells will result in interference effects that promote vertical drawdown around the well, therefore multiple well placements should be spaced beyond the radius of influence of the combined pumping rate.* Olin provides the Zone of Influence (100 ft) for a removal well pumping 2.0 gpm. Olin should provide the Zone of Influence distances for removal wells pumping 0.25 and 0.5 gpm.
6. Page 3-5 Groundwater. A description of the impact the operation of the town's water supply wells impact on the watershed divide should be included in the discussion. Historic water level data indicates the pumping of the town's wells will move the watershed divide to the south and east. Defining the watershed divide as the current condition is not appropriate.
7. Page 4-1 Sources of Contamination. *After the DAPL breached the elevation of the Jewel Drive bedrock saddle (approximately 56 ft MSL), DAPL flowed over the saddle allowing DAPL to seep vertically into weathered bedrock between the off-PWD DAPL pool and the Main Street Pool, and subsequently into and filling the Main Street bedrock depression up to the elevation of the Main Street bedrock saddle (40 ft MSL). Once that saddle elevation was exceeded, DAPL, accompanied by a convectively and gravity driven diffuse plume, flowed downward along the WBV to the bottom of the MMBA.* This old narrative should be updated to recognize the presence of bedrock fractures. DAPL could have "flowed" through the bedrock fractures to form the lower pools. Provide an analysis on why or why not this could not occur.
8. Page 4-2 Extent of DAPL. What defines the extent of DAPL. It is not clear how Olin defines the edge of the DAPL. Is it when the parameters in the S.G. Eqn produces a result greater than 1.025 or is the DAPL based on specific conductance being greater than 20,600 $\mu\text{mhos/cm}$? A more updated and complete of the DAPL definition should be completed with the updated data.
9. Page 5-5 Migration Pathways. *In summary, currently, due to these very flat gradients and oscillation of the groundwater divide that separates the Ipswich and Aberjona watersheds, the flux of dissolved constituents in Diffuse groundwater from the Main Street DAPL Pool to either watershed should be very limited.* The resumption of the town's water supply, will change the flat gradient and could increase gradients and diffusion from the DAPL pools.